Centracs® SPM

Specification

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683-10558-1016

Contents

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Glossary

AI – Artificial Intelligence

ATMS – Advanced Transportation Management System

CFD – Cumulative Frequency Diagram

FTP – File Transfer Protocol

GIS – Geographic Information System

GOR – Green Occupancy Ratio (Percent occupancy for a phase utilization detector during green))

MOE – Measure of Effectiveness

PCD – Purdue Coordination Diagram

ROR5 – Red Occupancy Ratio (Percent occupancy for a phase utilization detector during the first 5 seconds of a red phase)

SPM – Signal Performance Measure

VOS – Volume/Occupancy/Speed

VPN – Virtual Private Network

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1.1. System Software Overview

1.1.1. The system shall be a subscription-based web-hosted traffic data collection and traffic data analytics product.

1.1.2. The system shall collect and analyze “High-Resolution” data which shall be gathered from traffic controllers.

1.1.3. High-resolution data shall be collected and time-stamped, and include an event code. When applicable, event codes shall be accompanied by a parameter used to identify the source or nature of the event.

1.1.4. The system shall provide all services and software necessary for retrieving high-resolution controller data. The “On Premise” data collection service shall push the data to the cloud host for storage and processing.

1.1.5. The system shall collect controller level high-resolution data via FTP or other protocols from the controllers, or through SQL data queries to a Centracs database licensed to store the high-resolution data.

1.1.6. Data communication of high-resolution data to the cloud host shall be performed via a “push” to the cloud host from the On Premise data service. The On Premise data service shall not require an inbound port for these communications.

1.2. System Support and User Management

1.2.1. The system shall support authentication of individual users via individual user names and passwords.

1.2.2. The system shall not limit the number of user accounts that can be created to allow and grant access.

1.2.3. The system shall employ https to ensure user login names and passwords are encrypted prior to transmitting them over the internet.

2. System Graphical User Interface

2.1. General Display Features

2.1.1. The user web interface shall consist of a front page dashboard providing an overview of general traffic system health.

2.1.2. The system shall be capable of showing locations for degraded signal performance as a ‘Heat Map’.

2.1.3. Dashboard views shall include an indication of overall system health or performance.

2.1.4. The dashboard shall provide a list of signals with possible performance concerns.

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2.2. Map Display

2.2.1. The system shall incorporate a map view.

2.2.2. The map shall provide heat-map views that highlight problem areas.

2.2.3. The map shall allow a user to zoom and pan to identify specific intersections in more detail.

2.2.4. The user shall be able to click on an intersection to drill down to access a variety of SPM charts relating to the intersection.

2.3. SPM Date-Range Compares

2.3.1. The system shall be able to compare specific SPM metrics between two date ranges.

3. System Functions

3.1. Data Storage and Analytics

3.1.1. The system shall store high-resolution and system configuration data.

3.2. Field Communications

3.2.1. The system shall be capable of communicating to the field devices using FTP for uploading high-resolution data logs.

3.2.2. The system shall use a “store and forward” approach in which high-resolution data will periodically be uploaded from the traffic controllers using a field network communications infrastructure before uploading the data to the host servers for processing.

3.2.3. In the event that high-resolution data is stored on an Econolite Centracs server, the On Premise service shall be capable of retrieving the high-resolution data from the Centracs database and uploading to the SPM host without communicating with the field equipment.

3.3. Device Support

3.3.1. The system shall be capable of uploading high-resolution data from the following traffic signal controllers:

Vendor/Controller/Version	Upload Protocol	3rd Party Translator Required
Econolite ASC/3 NEMA - Version 2.50+ and OS 1.14.03+	Centracs/FTP	No
Econolite Cobalt – Any Version	Centracs/FTP	No

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3.1. Detector Diagnostic Analysis

3.1.1. The system shall be capable of providing a separate list of intersections with degraded detector performance.

3.1.2. The system shall apply statistical data science in analyzing detector performance in order to identify detectors that may not be fully operational.

4. Supported SPMs

4.1. Signal Performance Measures (SPM)

4.1.1. Signal Performance Measure charts, dashboards and/or tables shall provide a user selectable date selections.

4.1.2. The system shall provide the means to compare various performance metrics over user definable date ranges providing tabular comparison results with indications of improvement or degradation of the performance scores.

4.2. Arrivals on Green

4.2.1. The system shall track and report metrics relating to the volumes of traffic arriving at an intersection during the green interval.

4.2.2. The system shall provide an Arrival on Green chart, which graphs the volume (vehicles per hour), volume of vehicles arriving at the intersection on green and the percent of vehicles arriving on green for each cycle during a 1-day/24-hour period.

4.2.3. The system shall provide the Arrivals on Green chart for each phase of a signal that meets detection requirements.

4.3. Pedestrian Events

4.3.1. The system shall track and report metrics relating to pedestrian activity at each intersection.

4.3.2. The system shall provide a Pedestrian Delays chart, which graphs cycles during the day that experiences a pedestrian actuation on a phase. The chart will indicate the time during the day when the event took place and the amount of delay introduced by the pedestrian actuation.

4.3.3. The system shall provide the Pedestrian Delays chart for individual approaches of a signal or as a combined report for all approaches of a signal.

4.4. Power Failures

4.4.1. The system shall track and report metrics relating to power failures.

4.4.2. The system shall highlight individual intersections and corridors that have experienced power failures over a user specified date.

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4.5. Preemption Events

4.5.1. The system shall track and report metrics relating to preemption.

4.5.2. The system shall provide a table, which indicates each preemption event, the start time, and duration and cause of transition for a selected intersection.

4.5.3. The system shall provide preemption information on a corridor level and signal level indicating the total amount of time spent in preemption, average preemption duration, total number of preemption requests and total number of preemptions serviced.

4.6. Purdue Coordination Diagram (PCD) Report

4.6.1. The system shall provide a PCD, which graphs the volume (vehicles per hour), start of green, start of yellow, and start of red along with predicted vehicle arrivals based on detector actuations during each cycle throughout a day.

4.6.2. The system shall provide the PCD chart for each coordinated phase of a signal that meets detection requirements.

4.7. ROR_5/GOR

4.7.1. The system shall provide an ROR_5/GOR chart, which can be used to identify split failures when the ROR and GOR are both above 85% during the phase of a cycle. This scatter diagram shall cover all cycles for a phase during 1-day/24-hour period.

4.7.2. The system shall provide the ROR_5/GOR chart for each phase of a signal that meets detection requirements.

4.8. Split Failures

4.8.1. The system shall track and report metrics relating to split failures.

4.8.2. The system shall provide a Split Failures Report for each phase, which plots by percentages the ROR and GOR phase terminations for each cycle during a day.

4.8.3. The system shall provide the Split Failures Report for each phase of a signal that meets detection requirements.

4.9. Split Monitor Report

4.9.1. The system shall provide a Split Monitor chart, which, for each phase, plots by phase duration the phase termination reason for each cycle during the day. Reasons include Gap Out, Max Out, Force Off, Pedestrian call, and Unknown.

4.9.2. The system shall provide the Split Monitor chart for each phase of a signal that meets detection requirements.

4.10. Transitions

4.10.1. The system shall provide a table, which indicates each transition event, the start time, duration and cause of transition for a selected signal.

4.10.2. The system shall provide transition information on a corridor level and signal level indicating the total amount of time spent in transition, average transition durations for Add, Subtract, Dwell, and combined transition types.

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4.10.3. The system shall provide a signal level view of transitions allowing a user to investigate individual transition events.

4.10.4. For transitions due to pattern change, the report will also indicate the new pattern causing the transition.

4.10.5. For transitions due to Pedestrian events, the report will also indicate the phase for which the pedestrian transition was generated.

4.11. Vehicle Delays

4.11.1. The system shall provide a vehicle delay chart, which, for each phase graphs the combined amount of time, in seconds for all detected vehicles over all cycles throughout the day.

4.11.2. This report shall include the average delay per vehicle and the total amount of day for the entire day.

4.11.3. The system shall provide the Vehicle Delay report for each phase of a signal that meets detection requirements.

4.12. Volume/Capacity Ratio Report

4.12.1. The system shall provide a Volume/Capacity Ratio chart, which graphs the volume (vehicles per hour) against the theoretical capacity of the approach. Values are plotted for each cycle during a 1-day/24-hour period.

4.12.2. The system shall provide the Volume/Capacity Ratio chart for each phase of a signal that meets detection requirements.

4.13. Volumes

4.13.1. The system shall report metrics relating to vehicle delays at the system, corridor and intersection levels.

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